

How 20-foot containers are transferred in just 5 minutes – using the LinearChain

Thousands of trucks transport containers along our motorways every day. On arrival at their destination, the containers must be transferred. Either a crane or a fork-lift truck is required for this – plus an employee to operate these machines. That takes time, costs money and ties up resources. So it's not the ideal choice. Much more elegant is the solution with the LinearChain – the space-saving marvel manufactured by Grob Antriebstechnik in Sinsheim.

Goods transport by rail offers many advantages: safety, climate protection, planning security and reliability. But what happens when the goods have arrived at the terminal station? How does the container get from rail to road? And how can the transfer times and handling costs be kept to a minimum?



Container handling by means of the LinearChain

These are all good questions, to which the Swiss company InnoTrain AG has found convincing answers and has developed an innovative solution with the potential to conquer the global market. The central element of this solution is the LinearChain from Grob GmbH Antriebstechnik. But let's not get ahead of ourselves:

What does the situation look like today?

The goods train arrives at the terminal station. The container must now be loaded from the train onto the truck. This is usually done using a crane or a very large fork-lift truck (reachstacker). However, a driver is also required for this. And he must be available at precisely the moment when the truck arrives so that the transfer times are as short as possible and the handling costs do not make the transport unnecessarily expensive. Obviously such a solution is time-consuming, expensive and inflexible. Therefore a loading concept is required that is as independent as possible and where the driver can transfer the container himself.

An ingenious product now provides the solution

Such an innovative loading concept with integrated LinearChains has already been used very successfully in Switzerland since 2011. For example, railCare, the rail logistics subsidiary of the Swiss food wholesaler Coop, has been using the ContainerMover-3000 with growing success since 2011 and it is only a question of time until neighbouring countries such as Germany, France or Italy pick up on this trailblazing technology.



The Grob LinearChain in action

The LinearChain plays the leading role now

Environmental conditions are rather harsh in both road and rail transport. In summer the temperature can quickly rise to 35 °C, while in winter nights it can easily fall to -25 °C or even lower. Therefore the task for the InnovaTrain engineers was clear: to come up with a perfectly functioning transfer concept. "The market demands a simple solution that is as far as possible maintenance-free and trouble-free. Customers want the transfer times to be as short as possible today", says InnovaTrain's head of development Beat Wegmüller.

Background knowledge: The LinearChain – a special product

The LinearChain is a special product in linear drive technology, which shows its real strength when space is tight. The LinearChain consists of specially formed, high-precision mechanical chain links. They can work in both directions: pulling and "pushing".

When the LinearChain works in one direction it pulls like a normal chain. When the LinearChain pushes, i.e. when it works in the opposite direction, the chain links interlock with one another to make the chain rigid – it acts like a bar. *"Not only that, the chain can be rolled up, which saves an enormous amount of space. That is the main advantage of the LinearChain",* says managing director Eugen Reimche. *"In addition, customers value the possibility of being able to implement practically "endless" strokes with the LinearChain. This allows us to realise solutions where conventional linear drives are impossible due to the cramped spatial conditions, or where hydraulic or pneumatic systems are not desired."*

It therefore had to be a simple, maintenance-free and trouble-free solution consisting of only a few components. The result was an innovative solution with the potential to become a global solution, because the InnovaTrain engineers found the right product for this task in the LinearChain from Grob GmbH Antriebstechnik from Sinsheim in Baden-Württemberg, Germany.

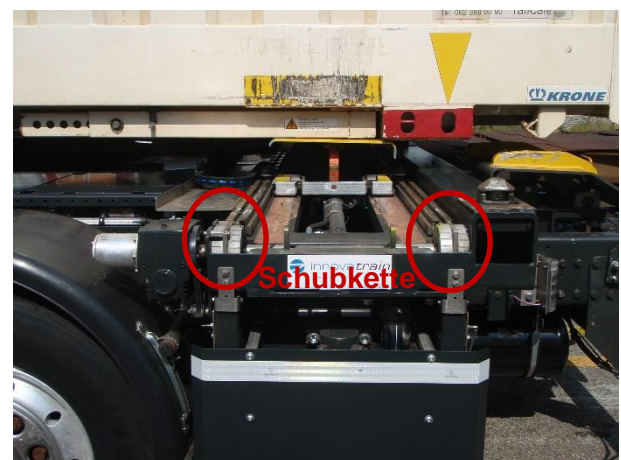
The transfer system consists of a lifting and lateral-pushing construction that is mounted modularly on the truck chassis. The counterpiece on the ContainerMover is the wagon adaptor on the railway wagon, which is secured via the standard container pegs and thus connects the construction on the truck chassis to the railway wagon.

Fast transfer in 5 minutes – thanks to the LinearChain: the space-saving marvel

The truck drives to the unloading station. The truck is aligned to the railway wagon by means of sensors, the support feet are extended and the height is adjusted. Under the container there are two so-called "mover bars", which are equipped with air bellows. Using the remote control, the container is raised off the truck pegs by means of compressed air. Now two LinearChain pairs are moved by two hydraulic motors, each pair moving a rolling mover bar sideways towards the railway wagon. The container stands on the two mover bars and is thus pushed from the truck onto the railway wagon (when unloading) when loading the truck the procedure is the exact opposite. Now the four LinearChain pull the container onto the truck. Therefore a chain is used here that can "push as well as pull".

The great advantage of the Grob LinearChain

Now and then the employees from InnovaTrain are asked: "Why don't you just take long hydraulic cylinders for the horizontal shift?" "Of course, that was our first idea back then", says managing director Pieter van den Bold, "but there is no room on the truck for them, because the container has to be shifted by more than its width – namely up to 3.2 metres. That can only be achieved with a rollable LinearChain. 12 metres of LinearChain are installed in each ContainerMover."



The Grob LinearChain pushes the container off the truck

The complete transfer, which is remotely controlled by the driver, takes less than 5 minutes. The InnovaTrain system only requires a road with a width of three metres for that. The transfer is possible on any freeloading or factory siding. There's probably no faster or cheaper way of transferring containers.